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(71) Applicant(s)

Corin Limited
(Incorporated in the United Kingdom)
The Corinium Centre, CIRENCESTER,
Gloucestershire, GL7 1YJ, United Kingdom

(72) Inventor(s)

Richard Ian Rawlinson
David Mark Fletcher

(74) Agent and/or Address for Service

A R Davies & Co
27 Imperial Square, CHELTENHAM, Gloucestershire,
GL50 1RQ, United Kingdom

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(56) Documents Cited

WO 00/44316 A

US 5871541 A

US 5358531 A

US 4216549 A

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INT CL⁷ **A61F 2/38**

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(54) Abstract Title

Unicompartmental knee prosthesis

(57) A unicompartmental knee prosthesis comprises a femoral component, a meniscal component 20 and a tibial component 30. The tibial component has a planar superior surface portion 34 surrounded by an upstanding lip 36 and the meniscal component has a planar inferior surface 24 of smaller anterior-posterior and medial-lateral dimensions than the planar superior surface portion of the tibial component such that, in use, limited anterior-posterior, medial-lateral and rotational movement of the meniscal component relative to the tibial component is allowed. In a preferred embodiment, the peripheral wall 26 of the meniscal component is undercut at 28 to receive the lip 36 of the tibial component.

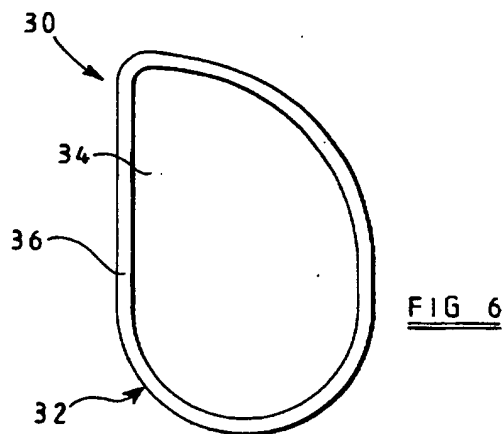
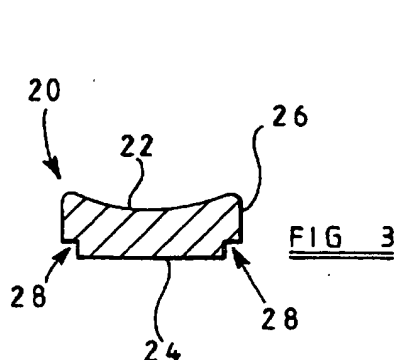


FIG 1

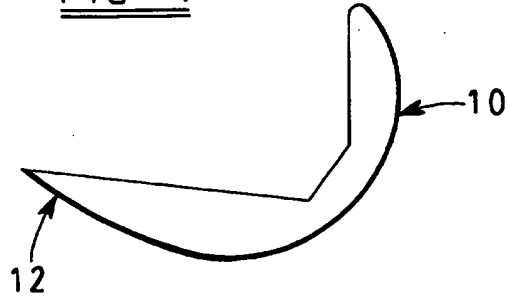


FIG 2

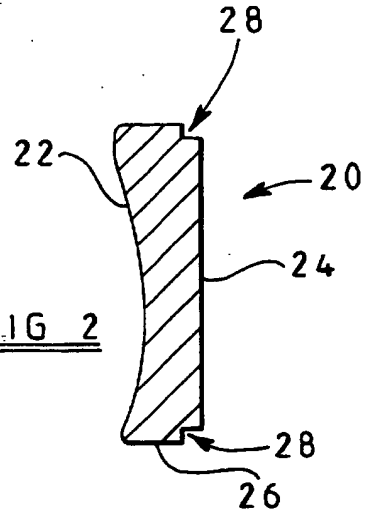


FIG 3

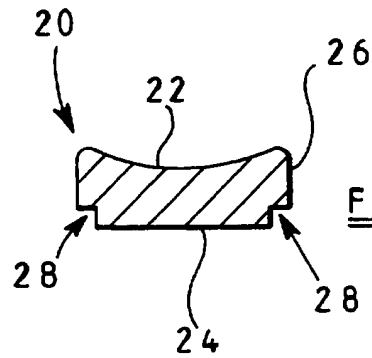
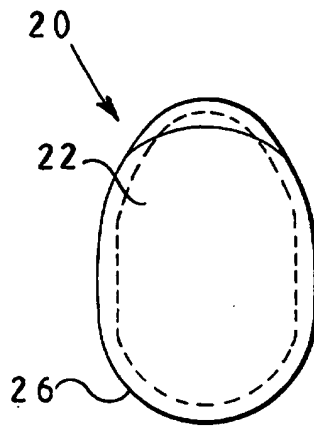


FIG 4



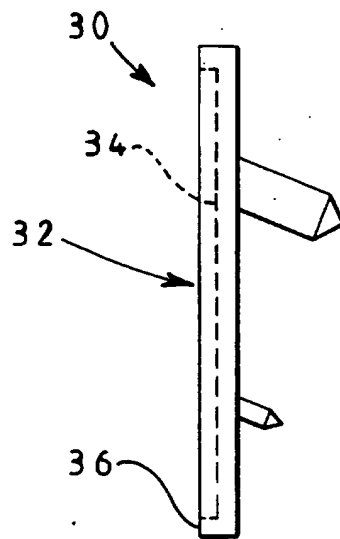


FIG 5

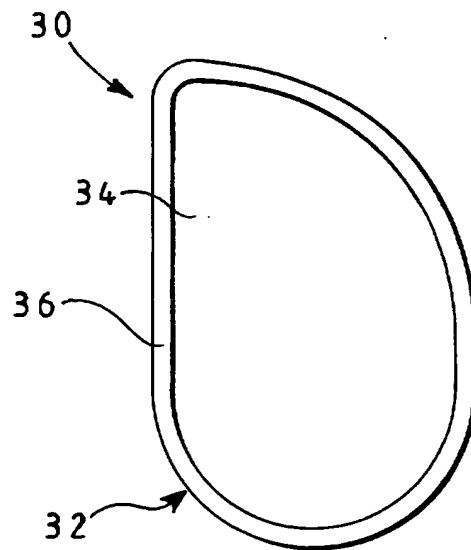


FIG 6

UNICOMPARTMENTAL KNEE PROSTHESIS

This invention relates to a unicompartmental knee prosthesis.

5 Unicompartmental knee prostheses, which allow replacement of only one side of a knee joint, are known. This type of prosthesis is used when one side of a knee joint is damaged or diseased but the other side is sufficiently healthy to continue to function normally. Unicompartmental replacement of one side or the other of the knee joint avoids unnecessary removal of healthy bone and other tissue, reduces the
10 recovery time of the patient and gives a higher probability of restoration of full function of the knee joint.

 Most known unicompartmental knee prostheses consist effectively of two components, the tibial component and the femoral component, although the tibial
15 component may be formed from a metal base and a high-strength, low friction plastics upper surface fixedly connected to the base. This means that the tibial component must be accurately located with respect to the femoral component, otherwise the knee joint will not manipulate smoothly and will not allow for maintenance of a high contact area between the femoral component and the plastics upper surface of the
20 tibial component. Providing accurate location of the tibial component significantly increases the length of the operative procedure because careful and expensive manipulative tests must be carried out before final location of the respective parts can be achieved. Also, the femoral component rotates whilst articulating with the tibial component and, therefore, the knee and tibial component are incongruent for a

substantial part of the movement cycle.

This problem has been overcome by providing a mobile meniscal component with a shaped upper side (superior surface) congruent with the femoral component, and a flat underside (inferior surface) to slide on the fixed tibial component.

The present invention seeks to provide an improved unicompartmental three-part knee prosthesis.

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According to the present invention, there is provided a unicompartmental knee prosthesis comprising a femoral component, a meniscal component and a tibial component, the tibial component having a planar superior surface portion surrounded or substantially surrounded by an upstanding lip and the meniscal component having a planar inferior surface of smaller anterior-posterior and medial-lateral dimensions than the planar superior surface portion of the tibial component, the meniscal and tibial components being freely separable from one another in a direction perpendicular to the planar superior surface of the tibial component and the meniscal component being, in use, permitted limited anterior-posterior, medial-lateral and rotational movement relative to the tibial component.

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The meniscal component has a peripheral wall between its inferior and superior surfaces, and preferably the lower portion of the peripheral wall is recessed so as to be capable of receiving the upstanding lip of the tibial component.

The tibial and femoral components are preferably formed of metal, typically a cobalt-chromium alloy, or a ceramic material, typically alumina. The meniscal component may be made from ultra-high molecular weight polyethylene.

5 The invention will now be more particularly described with reference to the accompanying drawings, in which:

Figure 1 is an enlarged side view of a femoral component forming part of an embodiment of a unicompartmental knee prosthesis according to the invention with
10 fixing means omitted,

Figure 2 is a side view of a meniscal component forming part of the embodiment of the unicompartmental knee prosthesis according to the invention,

15 Figure 3 is a front view of the meniscal component shown in Figure 2,

Figure 4 is a plan view of the meniscal component shown in Figure 2,

Figure 5 is a side view of a tibial component forming part of the
20 embodiment of the unicompartmental knee prosthesis according to the invention with fixing means omitted, and

Figure 6 is a plan view of the tibial component shown in Figure 5.

Referring now to the drawings, the individual components of a unicompartmental knee prosthesis are shown. These comprise a femoral component 10, a meniscal component 20 and a tibial component 30. The femoral component 10 is shown in Figure 1, and consists essentially of a unicondylar surface 12. The femoral component 10 is of standard shape and also includes some form of fixing component (not shown), such as a femoral stem. The femoral component 10 can be fixed to the prepared femur of the recipient of the prosthesis assembly by the fixing component. The fixing component forms no part of the present invention and will not be described in further detail.

10

The meniscal component 20 is shown in Figures 2 to 4. As shown in Figure 4, the meniscal component 20 is generally oval in plan view. The meniscal component 20 has a superior condylar surface 22, which is shaped to interact with and support the condylar surface 12 of the femoral component 10 such that both components, when in contact through the range of motion, are fully congruent. The meniscal component 20 also incorporates a planar inferior surface 24 and a peripheral wall 26 between the superior and inferior surfaces 22 and 24. The lower portion of the peripheral wall 26 is uniformly undercut to form a recess 28 extending around the perimeter of the inferior surface 24.

20

The tibial component 30 is shown in Figures 5 and 6. As shown in Figure 6, the tibial component is generally D-shaped in plan view. Essentially, the tibial component 30 comprises a superior surface 32 having a planar portion 34 across which the inferior surface 24 of the meniscal component 20 is intended to glide

during use. The tibial component 30 also incorporates an upstanding lip 36, which projects from the superior surface 32 and surrounds the planar portion 34. The tibial component 30 also incorporates fixing means (not shown) for fixing to the prepared tibia, the fixing means typically taking the form of pegs or stems. The fixing means
5 can be varied according to requirements and form no part of the present invention.

During normal working operation of the knee prosthesis, the recess 28 of the meniscal component 20 is capable of receiving the upstanding lip 36, and the relative dimensions of the inferior surface 24 of the meniscal component 20 and the
10 planar portion 34 of the tibial component 30 are such that the anterior-posterior, medial-lateral and rotational movement of the meniscal component 20 with respect to the tibial component 30 is limited. There is no mechanical restraint between the meniscal component and the tibial component. These two components are freely separable from one another in a direction perpendicular to the planar superior surface
15 of the tibial component.

The femoral component 10 and the tibial component 30 are formed from metal, preferably a cobalt-chromium alloy, or from a ceramic material, typically alumina. The meniscal component 20 is preferably formed of ultra-high molecular
20 weight polyethylene.

The condylar surface 12 of the femoral component 10 and the planar portion 34 of the superior surface 32 are highly polished to give a smooth finish. The fixing components of the femoral and tibial components and/or the other surfaces

which are designed to contact bone may be provided with a textured finish designed to encourage bone fixation. These surfaces may also be coated with an appropriate metal plasma coating and/or an osteoinductive coating such as hydroxyapatite.

5 The fact that the meniscal component 20 can move anteriorly, posteriorly, laterally and medially and can also rotate, all with respect to the tibial component 30, means that the meniscal component 20 can, within certain limits, select its own preferred position with respect to the tibial component 30. This means that the knee prosthesis can also tolerate small amounts of misalignment between the
10 femoral and tibial components 10 and 30 created during the operative procedure.

The embodiment described above is given by way of example only and various modifications will be apparent to persons skilled in the art without departing from the scope of the invention as defined in the appended claims.

CLAIMS

1. A unicompartmental knee prosthesis comprising a femoral component, a
meniscal component and a tibial component, the tibial component having a planar
5 superior surface portion surrounded or substantially surrounded by an upstanding lip
and the meniscal component having a planar inferior surface of smaller anterior-
posterior and medial-lateral dimensions than the planar superior surface portion of the
tibial component, the meniscal and tibial components being freely separable from one
another in a direction perpendicular to the planar superior surface of the tibial
10 component and the meniscal component being, in use, permitted limited anterior-
posterior, medial-lateral and rotational movement relative to the tibial component.
2. A unicompartmental knee prosthesis as claimed in claim 1, wherein the
meniscal component has a peripheral wall between its inferior and superior surfaces,
15 and the lower portion of the peripheral wall is recessed so as to be capable of
receiving the upstanding lip of the tibial component.
3. A unicompartmental knee prosthesis as claimed in claim 1 or claim 2,
wherein the tibial and femoral components are formed of metal.
20
4. A unicompartmental knee prosthesis as claimed in claim 3, wherein the
tibial and femoral components are formed of a cobalt-chromium alloy.
5. A unicompartmental knee prosthesis as claimed in claim 1 or claim 2,

wherein the tibial and femoral components are formed of a ceramic material.

6. A unicompartmental knee prosthesis according to any preceding claim,
wherein the meniscal component is made from ultra-high molecular weight
5 polyethylene.

7. A unicompartmental knee prosthesis substantially as hereinbefore described
with reference to the accompanying drawings.



Application No: GB 0010779.7

Examiner: Susan Chalmers
(Mrs)

Claims searched: 1-7

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Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.R): A5R:RAK
Int CI (Ed.7): A61F: 2/38
Other: ONLINE: EPODOC, WPI, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
E,X	WO 00/44316 A (AESCULAP) see Figures 2-4	1 at least
A	US 5871541 (GERBER) see Figures 1-6 and column 6 lines 8-37	
A	US 5358531 (GOODFELLOW) see Figure 3 and column 2 line 36 to column 3 line 19	
A	US 4216549 (HILLBERRY) see eg Figure 2 and column 3 lines 13-45	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.